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February 29, 2000

VIA HAND DELIVERY

ENTERED
Office of the Secretary
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The Honorable Vernon A. Williams
Secretary
The Surface Transportation Board
1925 K Street, N.W.
Washington, DC 20423-0001

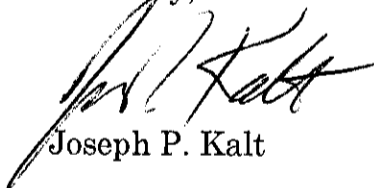
Re: Ex Parte No. 582 – Public Views on Major Rail Consolidations

Dear Secretary Williams:

Enclosed for filing in the in the above-captioned proceeding is the original and ten (10) copies of the text of the statement of Joseph P. Kalt and Amy Bertin Candell. Also enclosed is a 3.5 inch disk, containing the statement in WordPerfect xx format.

Please date stamp the enclosed extra copy of the statement and return it to the messenger for my files.

Sincerely,


Joseph P. Kalt

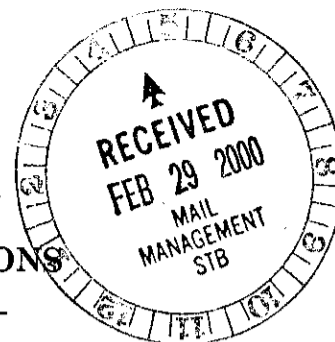

Amy Bertin Candell

:bmk
Enclosures

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB EX PARTE NO. 582
PUBLIC VIEWS ON MAJOR RAIL CONSOLIDATIONS

STATEMENT OF
JOSEPH P. KALT
AND
AMY BERTIN CANDELL



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I. INTRODUCTION

I.A Background and Qualifications

Joseph P. Kalt is the Ford Foundation Professor of International Political Economy at the John F. Kennedy School of Government at Harvard University in Cambridge, Massachusetts. At the Kennedy School, he is chair of the economics and quantitative methods program and has served as the faculty chair and Academic Dean for Research, chair of degree programs, and chair of the Ph.D. program. In addition, he works as an economic consultant with Lexecon Inc.

Professor Kalt received his Ph.D. (1980) and his Master's (1977) degrees in economics from UCLA. He attended Stanford University as an undergraduate, graduating with honors in economics in 1973. He is a specialist in the economics of regulation and antitrust, with a particular emphasis on the natural resource, transportation, and financial sectors. He has published, taught, and testified extensively on the regulation of industry in the United States. In addition to his research and teaching, he has testified in numerous legal, regulatory, and legislative proceedings concerning matters of competition and regulation. He has submitted expert verified statements before the Surface Transportation Board (STB) and its predecessor agency, the Interstate Commerce Commission (ICC), on a number of occasions. He has also provided testimony as an expert on

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mergers and related issues of competition before the U.S. Congress, the U.S. Federal Energy Regulatory Commission, the U.S. Department of Commerce, the U.S. Department of the Interior, various state public utility commissions, and numerous state and federal court proceedings. His curriculum vitae is included as Attachment 1.

Amy Bertin Candell is a senior economist at Lexecon Inc. Lexecon is an economics consulting firm that focuses on, among other things, competition and regulation, particularly in regulated industries. She received her Bachelor's degree in economics from the Massachusetts Institute of Technology (1987) and Master's (1991) and Ph.D. (1994) degrees in economics from Harvard University. Dr. Candell specializes in the economics of industrial organization and regulation. In the course of her work, she has consulted for numerous public and private clients on issues involving the economics of competition and regulation. She has filed testimony in federal court and has presented testimony before state and federal regulatory agencies. Her curriculum vitae is included as Attachment 2.

In the present proceeding, we have been asked by Burlington Northern Santa Fe (BNSF) to evaluate the public policy implications if the Surface Transportation Board were to take a more active and interventionist stance in managing the structure and timing of consolidations in the U.S. rail industry. We also examine the economic effects of the existing regulatory structure on the performance of U.S. railroads.

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I.B Summary

The revitalization of the rail industry is one of the success stories of U.S. public policy over the last 25 years. With the increased flexibility brought about through regulatory reform that culminated in the Staggers Rail Act of 1980, the rail industry has improved both its financial and its physical condition. In addition, service has improved dramatically and the rail industry has become a modern logistics and transportation provider that contributes to the smooth operation of the U.S. economy.

Ownership restructurings have had an important role in the revitalization of the U.S. rail system. Through restructuring, railroads have been working to overcome arbitrary, historical boundaries between networks and move toward creating systems that are driven by the economic logic of network systems. It never made sense to run a network industry based on the arbitrary ownership boundaries drawn by someone's Senator in the 1880s.

The STB merger policy has tools firmly in place that allow it to judiciously evaluate proposed mergers. The STB plays an important role in ensuring that rail industry consolidations do not portend an increase in monopoly power, and are based on well-structured operating plans. However, business decision-makers and shareholders rather than central planners are best positioned to make decisions about rail operations and efficient firm size and to ensure the continued success of the U.S. rail system.

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II. THE REVITALIZATION OF THE U.S. RAIL SYSTEM

Beginning with major regulatory reforms in the 1970s and culminating with the passage of the Staggers Rail Act of 1980, the U.S. railroad industry has improved its performance substantially. Greater rate flexibility, deregulation of rates in certain markets, and opportunities for negotiated, tailored service offerings are among the factors that have brought railroads under the discipline of the marketplace. Regulatory reform has also allowed the forces of the marketplace to bear more directly on the ownership structure of railroad assets. Increased freedom to abandon low-density, unprofitable service and to consolidate rail systems in order to exploit network economies has also contributed to improvements in the industry. The result has been a dramatic improvement in the nation's rail system, with efficiency gains for the system as a whole estimated to be as high as \$15 billion per year.¹ While there have been bumps in the road at times, these benefits have been shared by both the nation's railroads, who have improved their financial health, and the nation's shippers, who as a result have access to a railroad system that is more cost-effective and can provide quality service.

In response to opportunities provided by reformed regulation, the railroad industry:

- Reduced average rates in real and nominal terms;
- Improved productivity of labor and capital;
- Increased capital expenditures on infrastructure; and
- Improved financial health for the railroads.

Some of these results are summarized in Figure 1. Nearly all measures available demonstrate that the improvements in the rail industry

¹ Barnekov, C.C., and A.N. Kleit "The Efficiency Effects of Railroad Deregulation in the United States," *International Journal of Transport Economics*, February 1990, 21-36.

have benefited shippers, railroads, and the economy. As a result, this efficient rail system has become a key component in supporting the flow of goods and materials in an internationally competitive economy.

The current state of the rail industry contrasts dramatically with the situation of the 1960s and 1970s. Restrictive regulations in place before the wave of reforms involved federal regulators in a wide variety of decisions. This central-planning mentality led the federal government to participate in decisions such as altering route structures, changing rail operations, adjusting rates, etc. After years of operating under this regime, the industry was performing poorly. A large share of freight traffic had shifted away from railroads. The regulatory structure created disincentives to invest in infrastructure and made it difficult for the industry to attract capital. After years of underinvestment in maintenance and infrastructure, the physical condition of the U.S. rail network was deteriorating, affecting the ability of railroads to provide high quality service to their customers.

In the pre-Staggers era, ownership boundaries between rail systems had been dictated by a political process rather than determined by marketplace logic and incentives. The result was a rail network with boundaries between railroads that were largely economically arbitrary. These arbitrary boundaries inhibited the ability of the railroads and their customers to realize economies of density (i.e., volume) and scope (i.e., geographic and service coverage) that are inherent in a network-based system. The industry's declining physical condition was evidence that capital markets did not and would not invest in rail systems that could not realize efficiencies because of a historically imposed structure.

After the passage of the Staggers Rail Act of 1980, railroads were subject to the discipline of the marketplace to a much greater extent. Railroads were allowed to make private decisions regarding operations, investments, pricing, and service offerings in response to market forces,

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subject to regulatory constraints that protected shippers. Reformed regulation regarding mergers, spin-offs, and abandonment of unprofitable rail lines enabled railroads to begin to take advantage of fundamental economic efficiencies inherent in network systems. The miles of road owned by Class I railroads fell from 165 thousand miles in 1980 to 101 thousand miles in 1998 as railroads rationalized their networks, spinning off low-density lines to short line railroads, and focusing to a greater extent on their core systems. Since the passage of the Staggers Act, consolidations occurred as railroads expanded their systems, offering shippers improved routings and single-line service to additional locations.

These kinds of consolidations and rationalizations have been motivated by the network economies that can be reaped from improved integration. Efficient integration of network systems permits costs – both overhead/fixed costs and operating costs – to be saved, as duplicative facilities and operations are eliminated, interrelated network “nodes” (e.g., junctions, yards, repair shops, etc.) are coordinated, and routes are shortened while the average length of haul increases. Efficient integration also lets customers realize improved service quality as speed and reliability are enhanced, equipment is more productively utilized, and frequency of service is increased. Evidence on the mergers in the 1980s suggests that these mergers yielded substantial cost savings and were one of the factors that contributed to increased rail productivity.² Consolidations have continued in the 1990s, and the Union Pacific/Southern Pacific and the CSX/Norfolk Southern/Conrail consolidations have raised concerns regarding the *implementation* of the integration process. However, when consolidations have been largely end-to-end in nature and have been properly implemented, they have continued to build more integrated and efficient networks.

² See Velluro, Christopher, et al., “Deregulation, Mergers, and Cost Savings in Class I U.S. Railroads, 1974-1986,” *Journal of Economics and Management Strategy* (Summer 1992), 339-369.

Vague claims made about reductions in the overall number of Class I railroads are misleading. These claims are made very generally and not in the context of a well-defined transportation market. No single shipper ever had access to the dozens and dozens of railroads that existed before 1980. As railroads have consolidated, the STB and the ICC have been vigilant in protecting rail options of shippers. In the context of merger policy, there is now strong precedent that preserves options for a shipper who had access to two rail options prior to the proposed merger. Indeed, no merging parties seem to ever come before the Board anymore without pre-conditioning their transaction by preserving access to at least two rail options. This bespeaks clear and forceful policy aimed at protecting competition and the public interest.

III. THE CONTEXT OF THE CURRENT PROCEEDING

The STB has organized the current proceeding to review "strong sentiment for a public review at this time of what the evolving structure of the North American railroad industry is and should be" (STB decision in Ex Parte No. 582, January 24, 2000). In its decision announcing the public policy rationale behind this hearing, the STB notes that although this proceeding was precipitated by the BNSF and CN transaction, its intent is not to prejudge the BNSF and CN application. Instead, the STB seeks to provide a forum for issues related to rail consolidations. There have been varied suggestions for the course of action that the STB should follow. Some parties have called for no more change in the structure of the rail industry, citing the decrease in major Class I railroads from 39 in 1980 to 7 today.³ Other parties suggest slowing down or regulating the pace of rail consolidation, citing the "need to concentrate on existing opportunities to improve service" (EP 582 decision, January 24, 2000). Yet other parties are concerned that "strategic responses [to the BNSF and CN

³ This reduction was due both to consolidations and to changes in the definition of Class I status.
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combination]...would lead to significant additional consolidation, and possibly other changes in the structure of the rail industry or in the way in which the rail industry is regulated" (EP 582 decision, January 24, 2000).

Against this backdrop, the STB has decided to hold this public hearing. Many of the concerns cited by the STB as motivations for this proceeding have the flavor of calls for the Board to take a more active role in managing the rail industry, which may lead to the re-emergence of heavy-handed central planning. Could moving STB policy in this direction be good public policy?

From a public policy perspective, it would be a mistake for the Board to adopt a policy that measures proposed transactions against, or defers even considering such proposed transactions because of, some administratively-determined template for the "ideal" ultimate structure. In trying to predetermine the efficient size, scope, and timing of consolidations, regulators would have to "outguess" business decision-makers and private capital markets. Shareholders and those risking their own money in private capital markets are in a better position to determine future organization and ownership of the rail industry. Even if the STB is able to (and should) articulate its view of what the future structure of the railroad industry should look like, it cannot actually force railroads and capital markets to adopt its preferred position. That is, the STB may be able to prevent actions that capital markets prefer, but it cannot force capital markets to fund its preferred outcome.

When arguments for central planning and delay come from competitors, we should be particularly wary. When a competitor opposes a merger, it is likely because a player in the industry will become more efficient. Otherwise, competitors would not be likely to oppose such consolidations. On the other hand, the creation of more efficient transportation systems is beneficial to consumers and in the public interest,

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but may hurt individual competitors. Postponing or holding up efficient transactions that do not have significant competition concerns delays the stream of benefits to the shipping public and aids only competitors who oppose such transactions for reasons related to private, not public, interests.

If the STB were to actively plan and manage the structure and timing of rail consolidations, the decision-making process could potentially become highly politicized. This would be no fault of any individual; it would merely reflect the reality of planning through government action. Pre-planning the structure of the industry necessarily creates winners and losers. The planning process would create forums and mechanisms to politicize these issues, creating "camps" and vested interests on both sides. Therefore, there could be an increase in political influence on decision-making processes as applicants, opponents, shippers, unions, and other parties express their opinions about the "correct" structure of the rail industry and try to exert influence on the process. Although the focus of the STB will be on the public interest, the opinions of this diverse set of parties may not be related to potential competitive concerns or other issues that are in the public's interest. In the extreme, a balancing of issues raised by all of these parties may take precedence over good analysis. The historical experience of the rail industry under the previous regulatory regime show the deleterious effects of the political system's involvement in the micro-management of business decisions.

Since the world is a dynamic, rapidly changing, and hence risky, place, it is difficult, as we sit here today, to reliably predict outcomes. We can expect the best outcomes when those who reap potential rewards and bear the financial risks and cost of error make the decisions about what course to follow. Experience in other industries has taught us that economists and deregulators are not particularly good at anticipating the innovations in structure and behavior that occur after regulatory reform, when

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organizations, technologies, and capital markets are freed to pursue efficiencies. Industries subject to the competitive forces of the marketplace continue to evolve in response to the demands of that marketplace in ways that may be hard to foresee.

In particular, deregulators and/or economists have been notably unsuccessful at predicting substantial changes in firms' operations, technology, or service patterns that are the result of the incentives provided by marketplace discipline. Economists Robert Crandall and Jerry Ellig have reviewed experiences related to regulatory reform in five industries. They report:

The five industries in this study present a plethora of examples of innovations that were not foreseen or planned beforehand. These include natural gas hubs, airline hub-and-spoke systems, and a multitude of new services and customer-premises equipment in telecommunications. Such developments should give pause to anyone who claims to be able to predict either the likely or the optimal market structure.⁴

It is speculative, at best, to predict what the structure of the U.S. railroad industry will look like in five or ten years. In whatever form future consolidations occur, the STB will have the opportunity to evaluate proposed consolidations whenever private parties decide that they make business sense and bring them before the STB for approval. It does not make sense to block or delay efficient mergers that provide benefits to consumers today or to enact policy that tries to generically determine the future structure of the U.S. rail industry. Indeed, delay in consideration or consummation of proposed transactions because of a sense that "the time is not right" has direct costs to the economy. When careful review determines that a transaction is efficient and does not harm competition, it should be allowed to take place expeditiously so that both consumers and railroads can take

⁴ Crandall, Robert, and Jerry Ellig, *Electricity Deregulation and Customer Choice: Lessons for the Electric Industry*, Center for Market Processes Monograph, 1997.

advantage of productivity improvements and innovations that flow from these consolidations.

IV. PUBLIC POLICY REGARDING OVERSIGHT OF MERGERS

The Surface Transportation Board and its predecessor organization, the Interstate Commerce Commission, have played an important and vital role in guiding the mergers of the last 20 years. When examining specific consolidation proposals, the Board considers competitive concerns, proposed operating and capital investment plans, and the effect of a proposed transaction on the functioning of the larger rail network.

While mergers can improve industry efficiencies, it is also possible for mergers to have harmful effects on competition. This possibility is precisely why the STB examines in detail the likely economic effects of proposed mergers. The current policies that the STB utilizes to assess restructuring in the rail industry are proper and well-used. STB policy protects shippers by protecting competition and, when necessary, granting conditions to prevent monopoly abuses.

STB policy follows one of the basic tenets of antitrust/competition policy: protecting competition, not competitors. As long as competitive alternatives are preserved, then the STB lets market forces determine where in the system there are efficiencies to exploit, and lets shareholders and business decision-makers suggest both the scope and the timing of such transactions. Customer preferences determine which players will move what traffic based on price, service, delivery time, routings, information, etc. The STB has the critically important role of carefully evaluating specific transactions brought forward by parties interested in combining their systems.

In reviewing specific proposed transactions, the Board plays an important role in not only analyzing competitive issues, but also in ensuring

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that railroads have well-thought out operating plans and have a plan for needed capital investments. In this way, the STB plays an important role in making sure that the implementation of mergers is carefully planned. The STB requires applicants in consolidations to prepare a detailed operating plan and to present other evidence about how the consolidated railroad will be run. After a transaction takes place, the Board also has an appropriate role in ensuring the quality of service through its oversight policies.

Despite these standards, there has been an outcry in recent years about service problems in the wake of the Union Pacific/Southern Pacific and the CSX/Norfolk Southern/Conrail consolidations. But, difficulties in one transaction should not become the basis of an automatic delay for other transactions. Each transaction should be assiduously examined and judged on its own merits by the standards that the Board has established.

V. CONCLUSIONS

- Current STB policy protects shippers by carefully examining potential mergers, establishing strong policies that prevent monopoly abuses, and carefully reviewing proposed post-transaction operations. STB policy is rightfully aimed at protecting competition, and thus, the public interest – rather than the welfare of any particular competitors in the industry. The STB should avoid letting rail industry players dictate the pace of action of their competitors.
- Within the constraint of competition policy, the STB has allowed marketplace logic to dictate where goods are delivered, at what prices, in what quantity, and under what terms and conditions of service.
- It would be a mistake for the Board to judge proposed transactions (or delay even considering proposed transactions) against an

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administratively-determined template of the “ideal” industry structure. The delay that would be associated with a moratorium on transactions is not costless, and finding exactly the right template is an unrealistic hope.

- The ownership structure of the railroad industry and the timing of changes in that structure are decisions that are better suited to the driving force of business managers and capital markets. The proper role of public policy is to set down the rules of the game so that such decisions drive the marketplace to promotion of the public’s interest in competitive and efficient rail networks.

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Figure 1

IMPROVEMENTS IN RAIL INDUSTRY PERFORMANCE

SINCE THE STAGGERS ACT

	1980	1990	1998	% Change (1980-98)
Average Rates				
Freight Revenue Per Ton-Mile (Cents, Nominal Dollars)	2.867	2.657	2.342	-18%
Freight Revenue Per Ton-Mile (Cents, Constant 1980 Dollars)	2.867	1.756	1.306	-54%
Productivity				
Revenue Ton-Miles (Millions) Per Employee	2.1	4.8	7.8	271%
Revenue Ton-Miles (Millions) Per Mile of Road Owned	5.6	8.6	13.7	146%
Capital Expenditures				
Capital Expenditures Per Mile of Road (Constant 1980 Dollars)	19,619	20,085	39,914	103%
Volume of Traffic				
Carloads Originated	22,223,000	21,401,246	25,704,975	16%
Intermodal Traffic (Trailers and Containers)	3,059,402	6,206,782	8,772,663	187%

Notes: - All numbers refer to Class I Railroads.
- Constant dollars are calculated using the GDP implicit price deflator reported in *Economic Report of the President*, 2000.

Source: Association of American Railroads, *Railroad Facts*, 1999

Attachment 1

JOSEPH PEGGS KALT

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PROFESSIONAL EXPERIENCE

John F. Kennedy School of Government, Harvard University, Cambridge, MA
Ford Foundation Professor of International Political Economy, 1992 - present
Chair, Economics and Quantitative Methods Section, 1995 - present
Professor of Political Economy, 1986 - 1992

Areas of specialization include Industrial Organization, Economics of Antitrust and Regulation, Natural Resource Economics, Public Choice and Political Economy, Microeconomic Theory.

Co-Director, The Harvard Project on American Indian Economic Development, 1987 - present
Academic Dean for Research, 1992 - 1994
Chairman, Environment and Natural Resources Program, Center for Science and International Affairs, 1990 - 1994
Chairman of Degree Programs, 1990 - 1992
Assistant Director for Natural Resources, Energy and Environmental Policy Center, 1985 - 1990
Co-Director, Harvard Study on the Future of Natural Gas Policy (with Frank C. Schuller), Energy and Environmental Policy Center, John F. Kennedy School of Government, 1984-86

Department of Economics, Harvard University, Cambridge, MA
Associate Professor of Economics, 1983 - 1986
Assistant Professor of Economics, 1980 - 1983
Instructor in Economics, 1978 - 1980

Taught Economics of Antitrust and Regulation, Intermediate Microeconomics, and Principles of Economics.

February 2000

President's Council of Economic Advisers, Washington DC
Junior Staff Economist, 1974 - 75

Analyzed federal energy, environmental, transportation, and tax policies.

EDUCATION

University of California, Los Angeles

Ph.D. in Economics, 1980

Dissertation: "Federal Control of Petroleum Prices: A Case Study of the Theory of Regulation"

M.A. in Economics, 1977

Stanford University, Stanford, CA

B.A. in Economics, 1973

TESTIMONY

Te Ohu Kai Moana (Treaty of Waitangi Fisheries Commission)

In the High Court of New Zealand, Auckland Registry, between Te Waka Hi Ika O Te Arawa and Anor, and Treaty of Waitangi Fisheries Commission and ORs; between Te Runanganui O Te Upoko o Te Ika and ORS, and Treaty of Waitangi Fisheries Commission and ORS (Defendants); between Ryder and ORS, and Treaty of Waitangi Fisheries Commission and ORS; between Te Kotahitanga O Te Arawa Waka and ORS, and Treaty of Waitangi Fisheries Commission and ORS. Affidavit, February 4, 2000.

American Petroleum Institute

Before the United States of America Department of the Interior Minerals Management Service, Further Supplementary Proposed Rule for Establishing Oil Value for Royalty Due on Federal Leases. Declaration (with Kenneth W. Grant), January 31, 2000.

Amoco Production Company and Amoco Energy Trading Corporation

In the First Judicial District Court, County of Santa Fe, State of New Mexico, The Florance Limited Company, The M.J. Florance Trust No. 2, and The Florence A. Florance Trust vs. Amoco Production Co. and Amoco Energy Trading Corporation. Expert Report, December 15, 1999; Deposition, January 11-12, 2000.

February 2000

Reliant Technologies, Inc.

In the U.S. District Court, Northern District of California/Oakland Division, Reliant Technologies, Inc., vs. Laser Industries, Ltd., and Sharplan Lasers, Inc. Expert Report, October 15, 1999; Deposition, December 2-3, 1999.

El Paso Natural Gas Company

In the District Court of Dallas County, Texas, Transamerican Natural Gas Corporation vs. El Paso Natural Gas Company, Meridian Oil, Inc., Burlington Resources Inc., Richard M. Bressler, Travis H. Petty, William A. Wise, Oscar S. Wyatt, The Coastal Corporation, and Coastal Oil and Gas Corporation. Expert Report, September 24, 1999; Deposition, September 28, 1999; Affidavit, November 19, 1999.

Exxon Corporation

Before the Superior Court, State of California, Los Angeles, In the Matter of the People of the State of California, City of Long Beach, et al., v. Exxon Corporation, et al. Deposition, May 11-12, 19, 1999; Oral Testimony, July 22-23, 26-29, 1999.

AIMCOR, American Alloys, Inc., Elkem Metals Company, and SKW Metals & Alloys, Inc.

Before the United States International Trade Commission, In the Matter of Ferrosilicon from Brazil, China, Kazakhstan, Russia, Ukraine, and Venezuela. Oral Testimony, April 13, 1999.

El Paso Energy Corporation and El Paso Tennessee Pipeline Co.

EPEC Gas Latin America, Inc., and EPEC Baja California Corporation, Plaintiffs, v. Intratec S.A. de C.V. and Intratec Resource Co., L.L.C., Defendants and Third Party Plaintiffs, v. El Paso Energy Corporation and El Paso Tennessee Pipeline Co., Third Party Defendants. Expert Report, March 26, 1999.

Bass Enterprises Production Company

Bass Enterprises Production Company, et al., v. United States of America, Assessment of Bass Enterprises Production Company's and Enron Oil and Gas Company's Economic Losses Arising from the Temporary Taking of Oil and Gas Lease. Expert Report, March 19, 1999; Deposition, May 13, 1999.

Government of Canada

Before the Arbitration Panel Convened Pursuant to Article V of the Softwood Lumber Agreement Between The Government of Canada and The Government of the United States of America, Canada-United States Softwood Lumber Agreement: In the Matter of British Columbia's June 1, 1998 Stumpage Reduction. Economic Report, March 12, 1999.

Elkem Metals Company, L.P. and Elkem ASA

In the United States District Court for the Western District of Pennsylvania, Bethlehem Steel Corporation vs. Elkem Metals Company, L.P., and Elkem ASA. Expert Report, December 9, 1998; Deposition, March 26-27, 1999.

Shell Oil Company and Shell Western E&P, Inc., Mobil Producing Texas and New Mexico, Inc., and Cortez Pipeline Company

In the United States District Court, District of Colorado, United States Government and CO₂ Claims Coalition, LLC, vs. Shell Oil Company and Shell Western E&P, Inc., Mobil Producing Texas and New Mexico, Inc., and Cortez Pipeline Company. Expert Report, November 23, 1998; Deposition, January 11-12, 1999; Affidavit, January 21, 1999; Supplemental Expert Report, April 30, 1999.

American Alloys, Inc., Globe Metallurgical, Inc. and Minerais U.S. Inc.

In re Industrial Silicon Antitrust Litigation: Civil No. 95-2104, before the United States District Court, Western District of Pennsylvania. Oral Testimony, November 2, 1998.

Group of Oil Company Defendants

In re: Lease Oil Antitrust Litigation No. II, MDL No. 1206, before the United States District Court, Southern District of Texas, Corpus Christi Division. Deposition, September 28, October 15, 1998; Affidavit, October 8, 1998.

Rockwell International Corporation and Rockwell Collins, Inc.

In the United States District Court for the District of Arizona, Universal Avionics Systems Corporation, an Arizona corporation, v. Rockwell International Corporation, a Delaware corporation; Rockwell Collins, Inc., a Delaware corporation. Expert Report, September 15, 1998; Second Expert Report, November 18, 1998; Supplement to September 15, 1998, Expert Report, July 30, 1999; Supplement to November 18, 1998, Amended Second Expert Report, July 30, 1999; Deposition, September 22-23, 1999.

American Alloys, Inc., Globe Metallurgical, Inc., Minerais U.S. Inc., and SKW Metals and Alloys, Inc.

In re Industrial Silicon Antitrust Litigation: Civil No. 95-2104, before the United States District Court, Western District of Pennsylvania. Daubert Testimony, September 14, 1998.

Texaco, Inc.

In the Matter of Texaco Inc., et al., v. Duhe, et al., Before the United District Court for the Western District of Louisiana. Expert Report (with Kenneth Grant), June 30, 1999.

In the matter of John M. Duhe, Jr., et al. v. Texaco Inc., et al., Before the 16th Judicial District Court, Parish of Iberia, State of Louisiana. Oral Testimony, March 2, 1999.

In the Matter of Long, et al., v. Texaco, Inc., et al., Before the United States District Court for the Middle District of Louisiana. Expert Report (with Kenneth Grant), August 14, 1998; Deposition, October 2-3, 1998.

Honeywell, Inc.

In the matter of Litton Systems, Inc., v. Honeywell Inc., before the United States District Court, Central District of California, Case No. CV-90-4823 MPR (EX), Report on Assessment of Litton's Antitrust Damages, August 3, 1998; Deposition, August 24-August 26, 1998; Oral Testimony, December 2-4, 1998.

North West Shelf Gas Project

In the Matter of an Arbitration Between Western Power Corporation and Woodside Petroleum Development Pty. Ltd. (ACN 006 325 631), et al. First Statement, May 6, 1998; Second Statement, May 15, 1998; Third Statement, July 22, 1998; Oral Testimony, July 22-28, 1998.

Northern Natural Gas Company

United States of America before the Federal Energy Regulatory Commission, In the Matter of Northern Natural Gas Company. Prepared Direct Testimony, May 1, 1998.

Association of American Railroads

Market Dominance Determinations—Product and Geographic Competition, Before the Surface Transportation Board. Joint Verified Statement (with Robert D. Willig), May 29, 1998; Reply Verified Statement (with Robert D. Willig), June 29, 1998.

Review of Rail Access and Competition Issues, Before the Surface Transportation Board. Joint Verified Statement (with David Reishus), March 26, 1998; Oral Testimony, April 3, 1998.

Exxon Corporation and Affiliated Companies

In the United States Tax Court, Exxon Corporation and Affiliated Companies v. Commissioner of Internal Revenue. Rebuttal Report, February 19, 1998.

Exxon Company

Before the United States of America Department of the Interior Minerals Management Service, Review of the Federal Royalties Owed on Crude Oil Produced from Federal Leases in California. Affidavit, February 17, 1998.

Elkem Metals Company, L.P.

In Re Industrial Silicon Antitrust Litigation and Related Cases, In the United States District Court for the Western District of Pennsylvania. Expert Report, January 9, 1998; Deposition, February 5-6, 1998.

TransCanada Gas Services Limited

Paladin Associates, Inc., et al., v. Montana Power Company, et al., In the United States District Court for the District of Montana. Expert Report, November 19, 1997; Expert Rebuttal Report, December 22, 1997. Deposition, January, 1998. Affidavit May 19, 1998.

Koch Pipeline Company, L.P.

In the Matter of CF Industries, Inc. v. Koch Pipeline Company, L.P., Before the Surface Transportation Board. Verified Statement (with Amy B. Candell), November 10, 1997; Deposition, December 12, 1997; Reply Verified Statement, January 9, 1998; Rebuttal Verified Statement, February 23, 1998.

Phillips Petroleum Company

In the Matter of Canyon Oil & Gas Co. v. Phillips Petroleum Company, Before the United States District Court. Expert Report (with Kenneth Grant), September 30, 1997.

Union Oil Company of California and Shell Oil Company

Review of the Federal Royalties Owed on Crude Oil Produced from Federal Leases in California. Expert Report June 30, 1997.

CSX Corporation and CSX Transportation, Inc., Norfolk Southern Corporation and Norfolk Southern Railway Company

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PAPERS PRESENTED

Proceedings of the Fourth Annual DOE-NARUC Natural Gas Conference, Orlando, FL, February 1995.

Keynote Address, "Sovereignty and American Indian Economic Development," Arizona Town Hall, Grand Canyon, AZ, October 1994.

"Is the Movement Toward a Less-Regulated, More Competitive LDC Sector Inexorable?, (Re)Inventing State/Federal Partnerships: Policies for Optimal Gas Use," U.S. Department of Energy and The National Association of Regulatory Utility Commissioners Annual Conference, Nashville, TN, February 1994.

"Cultural Evolution and Constitutional Public Choice: Institutional Diversity and Economic Performance on American Indian Reservations," Festschrift in Honor of Armen A. Alchian, Western Economic Association, Vancouver, BC, July 1994.

"Precedent and Legal Argument in U.S. Trade Policy: Do they Matter to the Political Economy of the Lumber Dispute?" National Bureau of Economic Research, Conference on Political Economy of Trade Protection, February, September 1994.

"The Redesign of Rate Structures and Capacity Auctioning in the Natural Gas Pipeline Industry," Natural Gas Supply Association, Houston, TX, March 1988.

"Property Rights and American Indian Economic Development," Pacific Research Institute Conference, Alexandria, VA, May 1987.

"The Development of Private Property Markets in Wilderness Recreation: An Assessment of the Policy of Self-Determination by American Indians," Political Economy Research Center Conference, Big Sky, MT, December 4-7, 1985.

"Lessons from the U.S. Experience with Energy Price Regulation," International Association of Energy Economists Delegation to the People's Republic of China, Beijing and Shanghai, PRC, June 1985.

"The Impact of Domestic Regulation on the International Competitiveness of American Industry," Harvard/NEC Conference on International Competition, Ft. Lauderdale, FL, March 7-9, 1985.

"The Welfare and Competitive Effects of Natural Gas Pricing," American Economic Association Annual Meetings, December 1984.

"The Ideological Behavior of Legislators," Stanford University Conference on the Political Economy of Public Policy, March 1984.

"Principal-Agent Slack in the Theory of Bureaucratic Behavior," Columbia University Center for Law and Economic Studies, 1984.

"The Political Power of the Underground Coal Industry," FTC Conference on the Strategic Use of Regulation, March 1984.

"Decontrolling Natural Gas Prices: The Intertemporal Implications of Theory," International Association of Energy Economists Annual Meetings, Houston, TX, November 1981.

"The Role of Government and the Marketplace in the Production and Distribution of Energy," Brown University Symposium on Energy and Economics, March 1981.

"A Political Pressure Theory of Oil Pricing," Conference on New Strategies for Managing U.S. Oil Shortages, Yale University, November 1980.

"The Politics of Energy," Eastern Economic Association Annual Meetings, 1977.

WORKSHOPS PRESENTED

University of Indiana; University of Montana; Oglala Lakota College; University of New Mexico; Columbia University Law School; Department of Economics and John F. Kennedy School of Government, Harvard University; MIT; University of Chicago; Duke University; University of Rochester; Yale University; Virginia Polytechnic Institute; U.S. Federal Trade Commission; University of Texas; University of Arizona; Federal Reserve Bank of Dallas; U.S. Department of Justice; Rice University; Washington University; University of Michigan; University of Saskatchewan; Montana State University; UCLA; University of Maryland; National Bureau of Economic Research; University of Southern California

OTHER PROFESSIONAL ACTIVITIES

Chief Mediator *In the Matter of the White Mountain Apache Tribe v. United States Fish and Wildlife Service*, re: endangered species management authority, May-December, 1994

Steering Committee, National Park Service, 75th Anniversary Symposium, 1991-93

Board of Trustees, Foundation for American Communications, 1989 to present

Editorial Board, *Economic Inquiry*, 1988 to present

Advisory Committee, Oak Ridge National Laboratory, Energy Division, 1987 to 1989

Commissioner, President's Aviation Safety Commission, 1987-88

Principal Lecturer in the Program of Economics for Journalists, Foundation for American Communications, teaching economic principles to working journalists in the broadcast and print media, 1979 to present

Lecturer in the Economics Institute for Federal Administrative Law Judges, University of Miami School of Law, 1983 to 1991

Research Fellow, Energy and Environmental Policy Center, John F. Kennedy School of Government, Harvard University, 1981 to 1987

Editorial Board, MIT Press Series on *Regulation of Economic Activity*, 1984 to 1992

Research Advisory Committee, American Enterprise Institute, 1979 to 1985

Editor, *Quarterly Journal of Economics*, 1979 to 1984

Referee for *American Economic Review*, *Bell Journal of Economics*, *Economic Inquiry*, *Journal of Political Economy*, *Review of Economics and Statistics*, *Science Magazine*, *Journal of Policy Analysis and Management*, *Social Choice and Welfare*, *Quarterly Journal of Economics*, MIT Press, North-Holland Press, Harvard University Press, *American Indian Culture and Research Journal*

TEACHING EXPERIENCE

Introduction to Environment and Natural Resource Policy (Graduate, Kennedy School of Government); Seminar in Positive Political Economy (Graduate, Kennedy School of Government); Intermediate Microeconomics (Graduate, Kennedy School of Government); Natural Resources and Public Lands Policy (Graduate, Kennedy School of Government); Economics of Regulation and Antitrust (Graduate); Economics of Regulation (Undergraduate); Introduction to Energy and Environmental Policy (Graduate, Kennedy School of Government); Graduate Seminar in Industrial Organization and Regulation; Intermediate Microeconomics (Undergraduate); Principles of Economics (Undergraduate); Seminar in Energy and Environmental Policy (Graduate, Kennedy School of Government)

HONORS AND AWARDS

Allyn Young Prize for Excellence in the Teaching of the Principles of Economics, Harvard University, 1978-79 and 1979-80

Chancellor's Intern Fellowship in Economics, 9/73 to 7/78, one of two awarded in 1973, University of California, Los Angeles

Smith-Richardson Dissertation Fellowship in Political Economy, Foundation for Research in Economics and Education, 6/77 to 9/77, UCLA

Summer Research Fellowship, UCLA Foundation, 6/76 to 9/76

Dissertation Fellowship, Hoover Institution, Stanford University, 9/77 to 6/78

Four years of undergraduate academic scholarships, 1969-1973; graduated with University Distinction and Departmental Honors, Stanford University

Research funding sources have included: The National Science Foundation; USAID (IRIS Foundation); Pew Charitable Trust; Christian A. Johnson Family Endeavor; The Ford Foundation; The Northwest Area Foundation; the U.S. Department of Energy; the Research Center for Managerial Economics and Public Policy, UCLA Graduate School of Management; the MIT Energy Laboratory; Harvard's Energy and Environmental Policy Center; the Political Economy Research Center; the Center for Economic Policy Research, Stanford University; the Federal Trade Commission; and Resources for the Future

Attachment 2

AMY BERTIN CANDELL

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PROFESSIONAL EXPERIENCE

Lexecon Inc., Cambridge, MA
(formerly The Economics Resource Group, Inc.)
Senior Economist, 1994 - present
Economist, 1993 - 94

Provides economic and statistical analyses of complex issues in regulation, antitrust, and applied microeconomics to a variety of clients. Develops, manages, and oversees projects for clients and principals. Expertise in market and industry structure, antitrust economics, regulatory policy, and econometric modeling.

Harvard University, Cambridge, MA
Teaching Fellow, 1989 - 1993

Taught industrial organization and applied microeconomics.

The RAND Corporation, Santa Monica, CA
Consultant, Summer 1989

Analysis Group, Los Angeles, CA and Belmont, MA
Research Assistant, 1987 - 1988, summer 1986, summer 1985

EDUCATION

Harvard University, Cambridge, MA
Ph.D. in Economics, 1994
Dissertation: "Competition and Productivity in the Depression-Era Steel Industry"
Sumner Slichter Fund Fellowship, 1988-90
A.M. in Economics, 1991

Massachusetts Institute of Technology, Cambridge, MA
S.B. in Economics, 1987

TESTIMONY AND REPORTS

A Group of Cable Programming Networks

In the United States District Court, Southern District of New York, United States of America against American Society of Composers, Authors, and Publishers, In the Matter of the Application of Turner Broadcasting System, Inc., et al., Applicants, For the Determination of Reasonable License Fees, CIV. NO. 13-95 (WCC). Expert Report on survey designed to measure music use on cable television, April 16, 1999; Deposition, August 18, 1999; Rebuttal Expert Report, December 16, 1999; Deposition, January 27, 2000.

Koch Pipeline Company, L.P.

Before the Surface Transportation Board, CF Industries Inc. v. Koch Pipeline Company, L.P., Docket no. 41685. Verified Statement (with Joseph P. Kalt) on market dominance and competitive structure of market for an ammonia pipeline, November 10, 1997; Deposition, December 22, 1997.

Commonwealth of Massachusetts, Division of Energy Resources

Before the Massachusetts Department of Public Utilities, Boston Gas Company, DPU 96-50. Prepared Written Testimony (with Barbara Kates-Garnick) on performance-based rate making, July 19, 1996; Oral Testimony, August 23, 1996.

"Planning for Change, Preparing for Growth: Implications for Massachusetts of Reductions in Federal Research Spending" (with Adam B. Jaffe, Kenneth W. Grant, Michael Laznik, and Kelly T. Northrop), The Economics Resource Group, Inc., funded by the Massachusetts Technology Collaborative, February 1996.

"Indexing Natural Gas Pipeline Rates" (with Joseph P. Kalt, Sheila M. Lyons, Stephen Makowka, and Steven R. Peterson). The Economics Resource Group, Inc., April 1995.

SELECTED CONSULTING EXPERIENCE

Copyright Clearance Center

Provided statistical and economic support for copyright licensing and distribution systems. Projects include the design of a market-based approach to the valuation of copyright licenses, support of distribution of royalties, analysis of academic permissions and expansion of the system to include government photocopying. (ongoing)

Association of American Railroads

Evaluated the economic framework of the Surface Transportation Board's market dominance guidelines. (1998)

CSX Corporation/CSX Transportation

Analyzed competitive effects of Conrail transaction for use in testimony before the Surface Transportation Board. Managed large scale analysis of competitive issues and advised attorneys on economic issues. (1997)

Commonwealth of Massachusetts, Division of Energy Resources

Provided analytical and policy support on state-level gas industry restructuring issues in a variety of cases. Issues examined include commodity unbundling, performance-based ratemaking, and the creation of workably competitive markets. (1996-97)

Burlington Northern Santa Fe

Analyzed negotiated settlement agreements in the proposed merger of Union Pacific/Southern Pacific. Assisted in development of supporting testimony and litigation strategy. (1996)

Pennzoil Company

Performed economic analysis to refute plaintiff's liability and damage claims in an alleged price fixing conspiracy. (1996)

Massachusetts Technology Collaborative

Co-authored a study assessing the effects of reductions in federally-funded R&D on the Massachusetts economy. Examined linkages between university research and the private sector and developed models to quantify impacts of spending reductions. (1995-96)

Interstate Natural Gas Association of America

Explored indexing as a form of incentive regulation for natural gas pipelines and created the Pipeline Producer Price Index. Analyzed comments on incentive ratemaking proposals in the natural gas pipeline generic proceeding before the FERC. (1995)

Television Music License Committee

Critiqued statistical study of music usage in local television programming. (1995)

Burlington Northern Industries-Santa Fe Pacific Corporation

Performed economic analyses of the competitive effects of a proposed merger. Developed and managed a large-scale statistical analysis of competitive issues; examined and rebutted shipper claims of vertical foreclosure; and analyzed coal transportation markets. (1994-95)

Burlington Northern Railroad Company

Analyzed pricing provisions of two long-term coal transportation agreements, in defense of a shipper claim of overcharges because contract rates failed to reflect railroad productivity improvements. Assisted in the development of trial testimony that ultimately led to the dismissal of all claims. (1994)

Sagasco Holdings Limited

Investigated competitive issues in Australian natural gas markets in a proposed merger of vertically-integrated companies and assisted in preparation of written testimony. (1993)

PUBLICATIONS AND RESEARCH

"The Regional Economic Impact of Public Research Funding: A Case Study of Massachusetts" (with Adam B. Jaffe), in L.M. Branscomb, F. Kodama, and R. Florida, eds., *Industrializing Knowledge: University-Industry Linkages in Japan and the United States*, MIT Press, 1999.

Industrial Inefficiency and Downsizing: A Study of Layoffs and Plant Closures (with Matthew Krepps), Garland Publishing, Inc., Fall 1997.

"Localized Competition and the Aggregation of Plant-Level Increasing Returns: Blast Furnaces 1929-1935" (with T. Bresnahan and D. Raff), *Journal of Political Economy*, April 1996.

"Technological and Organizational Factors in Productivity: Evidence from the Blast Furnace Industry," unpublished manuscript, May 1991, revised September 1992.

"The Role of Competition in Regulating Financial Depository Intermediaries" (with Michael F. Koehn), in the American Bar Association Monograph *Competition and Regulation of Financial Intermediaries*, 1988.